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ART 34 AMOD

Claims

1. A process for making a hydrogel comprising 10-90 wt% water, 10-60 wt% of cross-linked hydrophilic polymer made from at least one starting monomer type, and 10-80 wt% of at least one polyol, characterized in that said process comprises the steps of:

- 1) preparing said starting monomer(s) solution from 10-90 wt% water, from 10-60 wt% of said starting monomer(s) and from 10-80 wt% of said polyol(s), and adding a modifying compound in said monomer solution prior to polymerization of the so formed mixture and thereafter
- 2) polymerizing said monomer(s) within a reaction medium comprising from 10-90 wt% water from 10-60 wt% of said starting monomer(s) and from 10-80 wt% of said polyol(s), in the presence of the modifying compound to thereby form a hydrogel,

wherein the modifying compound is selected from the group consisting of scavenger compound, chain transfer agent, compound which is a scavenger compound and chain transfer agent.

2. A process according to claim 1 wherein the modifying compound is added directly to the monomer solution before the polymerization preferably in a stirring vessel, a tube or a static mixer.
3. A process according to claim 1 or 2 wherein the modifying compound is a scavenger compound.
4. A process according to claim 1 - 3 wherein the modifying compound is a chain transfer agent.
5. A process according to claim 1 - 4 wherein the modifying compound is a scavenger compound and chain transfer agent.
6. A process according to claim 1 - 5 wherein the residual monomer(s) concentration in the hydrogel product of step 1), is below 10000 ppm, preferably below 1000 ppm, more preferably below 500 ppm, even more preferably below 200 ppm, and most preferably below 10 ppm.

7. A process according to claim 1-6 wherein the polymerization of said starting monomer(s) is conducted at a pH 3.5 to 7, preferably 4 to 6.5, more preferably 4.5 to 6.
- 5 8. A process according to claims 1-7 wherein said hydrogel comprises 20-70 wt% water.
9. A process according to claims 1-8 wherein said adding a modifying compound in step 1) comprises adding to the said monomer premix solution a nucleophile
10 which reacts with said residual starting monomer(s), impurity(s) and/or by-products by an addition reaction.
10. A process according to claims 1-9 wherein said by-product(s) comprise α,β -unsaturated carbonyl(s) produced from said polyol(s).
- 15 11. A process according to claim 10 wherein said polyol is glycerol.
12. A process according to claims 1-11 wherein said by-product(s) comprise acrolein.
- 20 13. A process according to claim 9 wherein said nucleophile is selected from the group consisting of ammonia, amines, polyamines, hydroxylamine, hydrazine, aminoguanidine, thiols, sulfites metabisulfites and bisulfites.
- 25 14. A process according to claim 13 wherein said nucleophile is bisulfite.
15. A process according to claim 14 wherein the bisulfite is present in amounts of less than 30000 ppm, preferably less than 10000 ppm, more preferably less than 5000 ppm, most preferably less than 1000 ppm, with respect to the product of
30 step 1).
16. A process according to claims 1-15 wherein the polymerization of said starting monomer(s) is conducted at least partly by UV irradiation.
- 35 17. A process according to claim 1-16 wherein said reaction medium comprises a photoinitiator.
18. A process according to claim 17 wherein said photoinitiator is selected from the group consisting of Darocur 1173, Irgacure 2959, Irgacure 500, and Irgacure
40 184.

19. A process according to claim 18 wherein said photoinitiator is used in said reaction medium at a concentration less than 5 wt%, preferably less than 1 wt%, more preferably less than 0.5 wt%, and most preferably less than 0.4 wt%.
20. A process according to claims 1-19 wherein the polymerization is conducted by UV curing, and the integrated UV intensity at wavelengths less than 280 nm, preferably less than 300 nm, more preferably less than 320 nm is less than 10%, preferably less than 7%, even more preferably less than 4%, most preferably less than 1% of the total integrated UV intensity with wavelengths less than 400 nm.
21. A process according to claim 20 wherein said polymerization is carried out under a total UVA energy ranging from 0.1-30 J/cm², preferably from 0.1-25 J/cm², more preferably from 1-20 J/cm².
22. A process according to claims 1-21 wherein said starting monomer(s) comprise acrylic acid.
23. A process according to claims 1-22 wherein said hydrogel is adhesive.
24. A process according to claims 1-23 wherein said hydrogel has a tan δ_{25} between 0.03 and 3.
25. A hydrogel comprising 10-90 wt% water, 10-60 wt% of cross-linked hydrophilic polymer made from starting monomer(s), and 10-80 wt% of at least one polyol, said hydrogel being prepared by polymerizing said starting monomer(s) in the presence of said water and polyol(s), characterized in that said hydrogel contains less than 100 ppb, preferably less than 50 ppb, and most preferably less than 20 ppb of α,β -unsaturated carbonyl by-product(s) derived from said polyol(s) during polymerization.
26. A hydrogel according to claim 25 where said α,β -unsaturated carbonyl by-product comprises acrolein.
27. A hydrogel according to claim 25 or 26 which contains less than 200 ppm, preferably less than 100 ppm, more preferably less than 50 ppm, even more preferably less than 20 ppm, most preferably less than 10 ppm of residual starting monomer(s).

- 5 28. A hydrogel comprising 10-90 wt%, 10-60 wt% of cross-linked hydrophilic polymer made from starting monomer(s), and 10-80 wt% of a at least one polyol, said hydrogel being prepared by polymerizing said starting monomer(s) in the presence of said water and polyol(s), characterized in that said hydrogel has a $\tan \delta_{25}$ above 1.
- 10 29. A hydrogel comprising 10-90 wt% water, 10-60 wt% of cross-linked hydrophilic polymer made from starting monomer(s), and 10-80 wt% of polyol(s), said hydrogel being prepared by polymerizing said starting monomer(s) in the presence of said water and polyol, characterized in that said hydrogel comprises more than 20 ppb, preferably more than 100 ppb, even more preferably more than 500 ppb, and most preferably more than 1000 ppb of nucleophilic addition product(s) of the α,β -unsaturated carbonyl by-product(s) derived from said polyol(s) during polymerization.
- 15 30. A hydrogel according to claims 25-29 wherein said polyol is glycerol.
- 20 31. A hydrogel according to claim 29 wherein said nucleophilic addition product(s) comprise sodium 3-propanal sulfonate, 1-hydroxy-2-propene-1-sulfonate or 1-hydroxy-1.3-propane disulfonate.
- 25 32. A hydrogel according to claims 25-31 wherein said starting monomers comprise acrylic acid.
33. A hydrogel according to claims 25-32 wherein said hydrogel is adhesive.